

Annual Report - 2017

Award ID: 1068676

Institution: North Carolina State University

Title: IGERT- Genetic Engineering and Society: The Case of Transgenic Pests

Principal Investigator(s)

Name: Fred L. Gould

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Co-Principal Investigator(s) or Trainee/Associate Advisor(s)

Name: Andrew R. Binder

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Matthew M. Booker

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Zachary S. Brown

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Hannah J. Burrack

Project Years Active: 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Yasmin J. Cardoza

Project Years Active: 2013-2014, 2014-2015

Role in Project: Trainee/Associate Advisor

Name: Jason A. Delborne

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: John R. Godwin

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Kevin Gross

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Nick Haddad

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Nora Haenn

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Co-PI

Name: William C. Kimler

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: William Kinsella

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Jennifer Kuzma

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Alun Lloyd

Project Years Active: 2011-2012, 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Co-PI and Trainee/Associate Advisor

Name: Marce D. Lorenzen

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Lisa McGraw

Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017

Role in Project: Trainee/Associate Advisor

Name: Carolyn R. Miller
Project Years Active: 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Melinda S. Morrill
Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016
Role in Project: Trainee/Associate Advisor

Name: Nils Peterson
Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017
Role in Project: Trainee/Associate Advisor

Name: Mitch A. Renkow
Project Years Active: 2013-2014, 2014-2015, 2015-2016, 2016-2017
Role in Project: Trainee/Associate Advisor

Name: Mark D. Robinson
Project Years Active: 2013-2014
Role in Project: Trainee/Associate Advisor

Name: Max J. Scott
Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017
Role in Project: Trainee/Associate Advisor

Name: Walter N. Thurman
Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017
Role in Project: Trainee/Associate Advisor

Trainees

Name: Timothy D. Antonelli
Total number of months funded: 24
Project Years Active:
2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 12 months
2014-2015 Project Year - Trainee supported for 1 months
2015-2016 Project Year - Trainee supported for 0 months

Name: Gregory A. Backus
Total number of months funded: 24
Project Years Active:
2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months
2016-2017 Project Year - Trainee supported for 0 months

Name: Jennifer F. Baltzegar
Total number of months funded: 36
Project Years Active:
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Jessica C. Barnes
Total number of months funded: 36
Project Years Active:
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Katie K. Barnhill
Total number of months funded: 12
Project Years Active:
2014-2015 Project Year - Trainee supported for 0 months
2015-2016 Project Year - Trainee supported for 0 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Johanna E. Elsensohn
Total number of months funded: 36
Project Years Active:
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Nicole E. Gutzmann
Total number of months funded: 36
Project Years Active:
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Molly S. Hartzog
Total number of months funded: 36

Project Years Active:

2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 12 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Name: Michael S. Jones

Total number of months funded: 36

Project Years Active:

2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Sheron N. King

Total number of months funded: 24

Project Years Active:

2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months

Name: William A. Klobasa

Total number of months funded: 18

Project Years Active:

2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 7 months

Name: Caroline Leitschuh

Total number of months funded: 38

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 3 months

Name: Andrew C. Ludvik

Total number of months funded: 13

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 2 months

Name: Elizabeth A. Pitts

Total number of months funded: 38

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 3 months

Name: John P. Roberts

Total number of months funded: 11

Project Years Active:

2015-2016 Project Year - Trainee supported for 0 months
2016-2017 Project Year - Trainee supported for 11 months

Name: Megan E. Serr

Total number of months funded: 38

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 3 months

Name: Jayce Sudweeks

Total number of months funded: 36

Project Years Active:

2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 12 months
2016-2017 Project Year - Trainee supported for 12 months

Name: Rene X. Valdez

Total number of months funded: 27

Project Years Active:

2013-2014 Project Year - Trainee supported for 11 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months
2016-2017 Project Year - Trainee supported for 3 months

Name: Michael R. Vella

Total number of months funded: 10

Project Years Active:

2015-2016 Project Year - Trainee supported for 0 months
2016-2017 Project Year - Trainee supported for 10 months

Name: Amanda C. Walsh

Total number of months funded: 24

Project Years Active:

2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 12 months
2014-2015 Project Year - Trainee supported for 1 months
2015-2016 Project Year - Trainee supported for 0 months

Name: Sophia H. Webster**Total number of months funded:** 36**Project Years Active:**

2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 12 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months
2016-2017 Project Year - Trainee supported for 0 months

Name: Gabriel L. Zilnik**Total number of months funded:** 36**Project Years Active:**

2012-2013 Project Year - Trainee supported for 11 months
2013-2014 Project Year - Trainee supported for 12 months
2014-2015 Project Year - Trainee supported for 12 months
2015-2016 Project Year - Trainee supported for 1 months

Associates**Name:** Maria E. Adonay**Project Years Active:** 2015-2016, 2016-2017**Name:** Alonzo Alexander**Project Years Active:** 2016-2017**Name:** Arun Babu**Project Years Active:** 2014-2015, 2015-2016, 2016-2017**Name:** Sarah A. Cash**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Zachery DeVries**Project Years Active:** 2014-2015, 2015-2016, 2016-2017**Name:** Rebecca M. Edman**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Marie Gibbons**Project Years Active:** 2016-2017**Name:** Meredith Hawley**Project Years Active:** 2016-2017**Name:** Brian Hollingsworth**Project Years Active:** 2016-2017**Name:** Dona Kanavy**Project Years Active:** 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Rosemary Keane**Project Years Active:** 2014-2015, 2015-2016, 2016-2017**Name:** Ashley R. Kelly**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Meagan Kittle Autry**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Vassili Koupryanov**Project Years Active:** 2016-2017**Name:** Arina Loghin**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Kate Maddalena**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Tina Ndoh**Project Years Active:** 2014-2015, 2015-2016, 2016-2017**Name:** Steven Reyna**Project Years Active:** 2016-2017**Name:** Michael A. Robert**Project Years Active:** 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017**Name:** Stacy Roberts

Project Years Active: 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017

Name: Hyeongyul Roh

Project Years Active: 2016-2017

Name: Lauren Roland

Project Years Active: 2014-2015, 2015-2016, 2016-2017

Name: Julian Sass

Project Years Active: 2016-2017

Name: Jeremy Slone

Project Years Active: 2016-2017

Name: Katherine Swoboda-Bhattarai

Project Years Active: 2014-2015, 2015-2016, 2016-2017

Name: Brittany White

Project Years Active: 2016-2017

Name: Megan Williamson

Project Years Active: 2016-2017

Accomplishments and Contributions of the IGERT

Interdisciplinary Research Achievements

First Achievement: Preliminary findings made possible by the collaboration of many of our IGERT students in Dr. Marce Lorenzen's lab have resulted in a number of newly submitted grant proposals. If funded, these grants would bring approximately \$800,000 each to North Carolina State University to continue this interdisciplinary work. The grants submitted are: 1) National Science Foundation, Division of Molecular and Cellular Biosciences, Genetic Mechanisms, (renewal). Uncovering the Molecular Mechanisms of Selfish Genetic Elements. (PI: Lorenzen, M.D.), 2) Defense Advanced Research Projects Agency, Insect Allies Program, Introduction of synthetic disease and drought resistance to soybean crops using novel insect vector-virus delivery strategies. (PI: Yang, X. ORNL), 3) Defense Advanced Research Projects Agency, Insect Allies Program, Team Maize Hopper: Maize modification with leaf/planthopper-transmitted rhabdoviruses. (PI: Wang, G. OSU).

Second Achievement: Our third student cohort has completed their White Paper and submitted it for publication in the Journal of Responsible Innovation. Entitled "Anticipating Complexity in the Deployment of Gene Drive Insects in Agriculture", this paper considers how gene drive insects could intersect with some of the complexities that characterize agricultural systems. The development of gene drives is emerging in a landscape of pest management shaped by past and current approaches, experiences, regulations, public opinion and pest invasions. Because gene drive insects may spread well beyond their release area, stakeholder groups at different spatial scales need to be engaged in decisions about their deployment. This new paradigm both complicates and offers great promise for future pest management efforts. As the culmination of their interdisciplinary cohort research, this paper exemplifies the apex of our IGERT's contribution to their graduate education.

Third Achievement: As part of a large international consortium known as GBIRD, Genetic Biocontrol of Invasive Rodents, working to address the threat invasive house mice pose to biodiversity, several of our faculty and trainees are involved in answering the need to better understand their behavior to determine the viability of these animals in the wild. Caroline Leitschuh (Cohort 2) & Megan Serr (Cohort 2) have been raising lab and wild strains of mice under both standard and more naturalistic conditions to test for differences in anxiety-related and exploratory behavior due to genetic background and rearing conditions. Their preliminary findings are shedding light the usability of genetically modified rodents as a way to control invasive populations on islands where local wildlife is being threatened. Our GES Center along with the USDA, CSIRO, NSF, Texas A&M & the University of Adelaide are among the organizations committed to the continued success of this project.

Education Achievements

First Achievement: Our Colloquium has continued meeting weekly for the full duration of the 2016-2017 academic year. Our colloquia involve faculty, staff, students and postdocs from 4 different colleges at NCSU encompassing numerous disciplinary distinctions. In response to feedback from trainees, this year we focused on individuals with regulatory and industry experience. The ever-expanding world of genetic modification has demanded that we broaden our conversation from genetic pest management. Thus, this year we shifted our focus to specific policy experts with industry backgrounds, including Terry Medley, Scott Johnson, Katie Davis & Nicole Juba. Understanding the past and current hurdles facing regulation of GMOs and how the companies developing these technologies respond to such policies is vital to the future success of our trainees. Their views were balanced by talks from stakeholders who are critics of GMOs or of GMO governance such as Doug Gurian-Sherman, and Martha Crouch.

Second Achievement: Our IGERT has continued its GES minor through the 2016-2017 academic year with three students being awarded 1 year of full funding. Katie Barnhill (Forestry & Environmental Resources), Patrick Roberts (Public Administration) & Michael Vella (BioMathematics) had been deeply involved in our IGERT as associates and we were thrilled to be able to continue to enhance their interdisciplinary graduate educations by adding them as funded trainees. By providing this opportunity, we have expanded our potential trainee pool beyond just the traditional 2 year fellowships and incentivized a wider student participation in the GES minor. By continuing to draw in new students from various disciplines, we keep our GES community exciting and diverse. New participants provide unique educational opportunities & continue to expand our growing impact on the NCSU campus.

Third Achievement: Three of our IGERT-specific courses were taught again during this academic year, despite all three of our trainee cohorts having already completed them. The courses generated enough interest from students outside of the initial three IGERT cohorts, fourteen in total, to make offering them again feasible. Though they are part of the GES minor, only two of the three must be taken. One of the goals of the IGERT program was to effect true institutional change toward greater interdisciplinary education. The fact that our IGERT classes were in-demand enough to continue shows that we have achieved that goal. The courses were: Principles of Genetic Pest Management taught by Fred Gould (Entomology), Marce Lorenzen (Entomology) & Max Scott (Entomology), Emerging Technologies and Society taught by Jason Delborne (Forestry & Environ Resources), & Governance, Systems and Modeling taught by Alun Lloyd (BioMath) & Zack Brown (Ag Econ).

Trainee Achievements

First Achievement: This past September, at the XXV International Congress of Entomology (ICE) in Orlando, Florida, our team of IGERT trainees took first place in their debate and first place overall. Sophia Webster (Cohort 1, team captain), Johanna Elsensohn (Cohort 3), Jen Baltzegar (Cohort 3), & Nicole Gutzmann (Cohort 3) were given the debate topic: What is the single best strategy for decreasing dengue fever virus (breakbone fever) incidence worldwide? Their winning stance: Genetic engineering of *Aedes aegypti* using lethal genes to decrease dengue virus. This same team, minus Nicole, also won these same awards for their debate at the annual meeting of the Entomological Society of America last year.

Second Achievement: Elizabeth Pitts (Cohort 2), graduated in December of 2016, and is now working as a post-doctoral fellow for the NC State GES Center analyzing conflicts and contradictions in the governance of Genetic Pest Management. These conflicts stem in part from different ways of understanding what genetically modified organisms are and, accordingly, how they should be governed. To help make sense of these conflicts, her project draws on insights from a group of experts who convened for a three-day symposium on genetic pest management at NC State University in 2009. Because symposium participants represented multiple academic fields as well as non-governmental organizations and government agencies, their discussions aired a variety of perspectives on emerging biotechnologies and their attendant social, political, and ethical issues. Tracing areas of agreement as well as tensions and contradictions generates theoretical and practical insights into how we understand and govern genetic technologies.

Third Achievement: Several of our trainees were selected to be 2016 CCE graduate fellows for the GES Center through the Comparing Meanings of Responsible Innovation across Bioengineering Communities - Cultivating Cultures of Ethics in Science, Technology, Engineering, and Math (CCE STEM) grant sponsored by NSF. Rene Valdez (Cohort 2), Megan Serr (Cohort 2), Elizabeth Pitts (Cohort 2), Caroline Leitschuh (Cohort 2), and Katie Barnhill (1 Year Fellow) with students from the Initiative to Maximize Student Diversity (IMSD) program at NCSU, with faculty guidance, served as facilitators for reflective conversations with stakeholders outside of NCSU to form more robust community understandings of ethical cultures and responsible innovation in bioengineering. This grant provided an opportunity for IMSD and GES students to be engaged in the community and have hands-on experience in cultivating ethics and responsible innovation. Each student receive a \$3000 stipend with this award.

International Opportunities: Achievements

Research/Educational Achievement 1: Due to IGERT support, Jayce Sudweeks (Cohort 3) was able to attend a five-day workshop on the Narrative Policy Framework (NPF) held from August 8 through August 12 in Budapest, Hungary. The workshop was sponsored by European Consortium for Political Research and gave Jayce the opportunity to expand his knowledge of the NPF, which he is using for his entire thesis. The NPF is complex with nuances in how to measure the variables and do the coding. This course was taught by Dr. Michael Jones, one of the premier developers of the NPF, who has published several theoretical and research articles on the framework. The workshop included discussion of yet to be published articles on the NPF and provided the potential for ongoing, personalized assistance as Jayce continues his dissertation research. He believes the application of the Narrative Policy Framework can provide insight into how the policies surrounding GM are influenced by narratives and provide valuable clarity in the GE debate.

Research/Educational Achievement 2: Mike Jones (Cohort 3) & Jen Baltzegar (Cohort 3) traveled to Oaxaca, Mexico over the summer, to conduct field work for their third year funding project. To better understand maize weevil (MW) impact on farming families and communities they they began by collaborating with investigators in Mexico to establish optimal field site locations, travel schedules, and arranging local guide personnel. A bio-economic survey instrument was developed to evaluate socio-economic, grain trade, grain storage activity, biological infestation and environmental conditions at each survey location. They spent three weeks conducting sixty-five interviews and collecting physical samples from eight field sites located in both high and low altitude zones of the states of Oaxaca and Chiapas.

Research/Educational Achievement 3: All of Mike and Jen's survey data from Mexico (see above) has been transferred to electronic databases. A simple economic model of storage incentives and behavior has been adapted to help explain observed patterns. Preliminary analysis of the site socio-economic backgrounds has been conducted, with grain storage schedules differentiated between environmental zones and between large and small producers. This data will be incorporated into the integrated work. Laboratory work is ongoing to isolate and prepare maize weevil samples for next-generation sequencing. These data will be used to determine if genetic population structure exists between the different biological zones and/or correlates with various socio-economic zones identified through the economic analysis. They plan to have a manuscript submitted within a year.

Outreach Activities

Title: All Things Considered Program

Media Outlet/Organization: National Public Radio

Activity Date: 09/22/2016

Description: IGERT faculty, Fred Gould, was quoted on the All Things Considered radio program, As a GMO Pillar Wobbles, Biotech Companies Promise New Insect-Killing Genes, September 22, 2016.

Title: Associated Press Story

Media Outlet/Organization: Associated Press

Activity Date: 11/02/2016

Description: IGERT faculty, Jennifer Kuzma, was quoted in Associated Press Story on ?Risk experts: Candidates not focusing on biggest threats? November 2, 2016.

Title: Bill Nye Saves the World Interview

Media Outlet/Organization: Bill Nye Saves the World Netflix Show

Activity Date: 10/28/2016

Description: IGERT faculty, Fred Gould, participated in a panel discussion on October 28th for Bill Nye the Science Guy's new Netflix show.

Title: Boston Globe Article

Media Outlet/Organization: The Boston Globe

Activity Date: 08/21/2016

Description: IGERT faculty, Jennifer Kuzma, was quoted and research cited in The Boston Globe, ?Staying Ahead of Technology?s Curves?, August 21, 2016.

Title: Brigham Young University Radio Show

Media Outlet/Organization: Brigham Young University

Activity Date: 11/29/2016

Description: IGERT faculty, Fred Gould, was interviewed on Brigham Young University's Radio Show on the GE Crops Report.

Title: BugFest

Media Outlet/Organization: North Carolina Museum of Natural Sciences

Activity Date: 09/17/2016

Description: IGERT trainees (Johanna Elsensohn, Nicole Gutzmann, Caroline Leitschuh, Greg Backus, Gabe Zilnik) and faculty (Fred Gould, Alun Lloyd) participated in BugFest experience of over 100 insect-related exhibits, crafts, games and activities.

Title: Building with Biology, August

Media Outlet/Organization: Museum of Life and Science, Durham NC

Activity Date: 08/28/2016

Description: IGERT trainees Johanna Elsensohn, Nicole Gutzmann, Caroline Leitschuh, Megan Serr & Elizabeth Pitts volunteered at a Building with Biology event promoting conversations around the societal implications of engineering biology.

Title: Building with Biology, July
Media Outlet/Organization: Museum of Life and Science, Durham NC
Activity Date: 07/30/2016
Description: IGERT trainees ohanna Elsensohn, Nicole Gutzmann, Caroline Leitschuh, Megan Serr & Elizabeth Pitts volunteered at a Building with Biology event promoting conversations around the societal implications of engineering biology.

Title: Building with Biology, September
Media Outlet/Organization: North Carolina State University
Activity Date: 09/25/2016
Description: IGERT trainee, Caroline Leitschuh, organized a Building with Biology event promoting conversations around the societal implications of engineering biology. IGERT trainees volunteered: Johanna Elsensohn, Nicole Gutzmann, Megan Serr, Elizabeth Pitts

Title: CALS Engineering Mosquito Video
Media Outlet/Organization: CALS News
Activity Date: 08/15/2016
Description: IGERT trainee, Sophia Webster, was interviewed by Chris Liotta for video news reel on "Engineering a New Mosquito", August 15, 2016.

Title: CALS Global Academy Lecture
Media Outlet/Organization: CALS Global Academy, Argentinian Group
Activity Date: 09/13/2016
Description: IGERT faculty, Jennifer Kuzma, gave a lecture for Biotech Training Course for CALS Global Academy, Argentinian group Sept. 13, 2016.

Title: Communication & Outreach Group of the National Bsal Task Force
Media Outlet/Organization: Reptiles Magazine
Activity Date: 10/01/2016
Description: IGERT trainee, Megan Serr, participated in the Communication & Outreach Group of the National Bsal Task Force of 2016 on The Salamander Crisis: They face a deadly fungal threat. Report published in Reptiles Magazine, September/October 2016 issue.

Title: CPANC Presentation
Media Outlet/Organization: CPANC Crop Protection School
Activity Date: 12/06/2016
Description: IGERT faculty panel presentation by Jennifer Kuzma to keep citizens of North Carolina and professionals working in the field of crop protection informed about current crop protection standards, initiatives and product quality.

Title: Emerging Gene Editing Roundtable
Media Outlet/Organization: Meridian Institute
Activity Date: 10/14/2016
Description: IGERT faculty, Jennifer Kuzma, participated in roundtable on Emerging Gene Editing Technologies in Agriculture. Agree Transforming Food and Ag Policy, Convening Series, Meridian Institute., Washington DC, October 14 2016.

Title: Entomology Graduate Student Association
Media Outlet/Organization: North Carolina State University
Activity Date: 05/01/2017
Description: Our IGERT trainee, Nicole Gutzmann, was elected to serve as Outreach Coordinator for the NC State University Entomology Graduate Student Association from May 2016-2017.

Title: Future Biotech Policy Radio Show
Media Outlet/Organization: WCOM 103.5 FM
Activity Date: 09/21/2016
Description: IGERT faculty, Jennifer Kuzma, was interviewed on Future Biotech Policy, WCOM 103.5 FM, Chapel Hill and Carrboro Radio In Vivo <https://radioinvo.org/2016/09/21/future-biotech-policy/>. September 21, 2016.

Title: Genetic Engineering Day 2017
Media Outlet/Organization: North Carolina Museum of Natural Sciences
Activity Date: 04/15/2017
Description: Organized by IGERT trainee, Caroline Leitschuh, this event included activities and seminars in the NC Museum of Natural Sciences and a visit from Timothy Caulfield, a Canada Research Chair in Health Law and Policy, Professor in the Faculty of Law.

Title: Genetics Night
Media Outlet/Organization: Lacy Elementary School
Activity Date: 01/26/2017
Description: IGERT trainee, Johanna Elsensohn, volunteered at Lacy Elementary School Genetics Night. Raleigh, NC.

Title: Kevin Folta Webcast
Media Outlet/Organization: Kevin Folta Webcast
Activity Date: 12/12/2016
Description: IGERT faculty, Fred Gould, was interviewed for Kevin Folta's webcast project interview

Title: National Academies of Sciences, Engineering, and Medicine Gene Drives Report Public Release Team - Gov't
Media Outlet/Organization: National Academies of Sciences, Engineering, and Medicine
Activity Date: 06/08/2016
Description: IGERT faculty, Jason Delborne, gave briefings at the National Institutes of Health, Capitol Hill (staff of House Science Committee and Congressman from Illinois), the National Academies of Sciences, and the White House Office of Science & Tech Policy

Title: National Academies of Sciences, Engineering, and Medicine Gene Drives Report Public Release Team - Media
Media Outlet/Organization: National Academies of Sciences, Engineering, and Medicine
Activity Date: 06/07/2016
Description: IGERT faculty, Jason Delborne, gave media interviews to multiple new outlets including: New York Times, Associated Press, and Science Magazine.

Title: NBC News Story
Media Outlet/Organization: NBC News
Activity Date: 12/29/2016
Description: IGERT faculty, Jennifer Kuzma, interviewed and quoted in NBC News , 11 Surprising Predictions for 2017 From Some of The Biggest Names In Science, December 29, 2016

Title: NCSU Press Release
Media Outlet/Organization: Phys.org, Science Daily
Activity Date: 01/17/2017
Description: IGERT faculty, Jennifer Kuzma, research highlighted in NCSU press release, Phys.org, Science Daily, etc. New tool can help policymakers prioritize information needs for synthetic biology tech. January 17, 2017.

Title: New York Times Article
Media Outlet/Organization: New York Times
Activity Date: 12/27/2016
Description: IGERT faculty, Jennifer Kuzma, listed in New York Times article ?National Biotechnology Panel Faces New Conflict of Interest Questions?, December 27, 2016.

Title: PBS Nova Next Now Show
Media Outlet/Organization: PBS
Activity Date: 08/03/2016
Description: IGERT faculty, Jennifer Kuzma, quoted in PBS Nova Next Now ?Editing Out Pesticides?, August 3, 2016.

Title: Science Friday Guest
Media Outlet/Organization: Science Friday (Public Radio International, Airs on NPR)
Activity Date: 10/14/2016
Description: IGERT faculty, Jennifer Kuzma, was a guest on Science Friday (Public Radio International, Airs on NPR) with Ira Flatow, October 14, 2016.
<http://www.sciencefriday.com/segments/scientists-develop-a-hornless-cow-through-gene-editing/>

Title: Science Magazine Article
Media Outlet/Organization: Science Magazine
Activity Date: 06/08/2016
Description: IGERT faculty, Jennifer Kuzma, was quoted in Science magazine, ?U.S. Academies gives cautious go-ahead to gene drive? June 8, 2016

Title: Science Vs Podcast
Media Outlet/Organization: Gimlet Media
Activity Date: 04/16/2017
Description: IGERT faculty, Fred Gould, was interviewed by Wendy Zukerman on the Science Vs podcast about GM foods, <https://soundcloud.com/science-vs/gmo-omg>, April 16, 2017.

Title: STEM and STEAM Expo
Media Outlet/Organization: East Wake Middle School
Activity Date: 05/25/2017
Description: IGERT trainee, Johanna Elsensohn, volunteered as a judge for the STEM and STEAM Expo at East Wake Middle School in Raleigh, NC.

Title: Technician Article
Media Outlet/Organization: North Carolina State University
Activity Date: 10/03/2016
Description: IGERT faculty, Alun Lloyd, was quoted in The Technician, NC State University's newspaper in "NC State Research Fights Mosquito-spread Diseases Using Math", October 3, 2016.

Title: Think Magazine Article
Media Outlet/Organization: Think Magazine
Activity Date: 01/01/2017
Description: IGERT trainee, Sophia Webster, was interviewed on the state of her current research for Spring 2017 edition of the NC State graduate school magazine, Think Magazine.

Title: Triangle SciTech Expo
Media Outlet/Organization: North Carolina Museum of Natural Sciences
Activity Date: 04/08/2017
Description: IGERT trainee, Johanna Elsensohn, volunteered at the Triangle SciTech Expo, a unique event that assembles scientists and technical professionals from universities, organizations and industry to engage visitors of all ages in the excitement of science

Title: Trick-or-Treat at the Trails
Media Outlet/Organization: Garner Chamber of Commerce
Activity Date: 09/07/2016
Description: IGERT trainee, Johanna Elsensohn volunteered to help local kids Trick-or-treat around the park and collect treats from community organizations and local businesses. This annual event is free and draws thousands of participants each year.

Title: Wine Enthusiast Magazine Article
Media Outlet/Organization: Wine Enthusiast Magazine
Activity Date: 12/08/2016
Description: IGERT faculty, Jennifer Kuzma, was quoted in Wine Enthusiast magazine on "Can Science Save our Favorite Wines?" Decemr 8, 2016.

Title: Wired Magazine Article
Media Outlet/Organization: Wired Magazine
Activity Date: 08/30/2016
Description: IGERT faculty, Jennifer Kuzma, was quoted in Wired magazine article "Genes Might Be Helping the Tasmanian Devil Fight Off Face Cancer" August 30, 2016.

Title: WUNC Story
Media Outlet/Organization: WUNC
Activity Date: 10/20/2016
Description: IGERT faculty, Jennifer Kuzma, was quoted in WUNC story "Scientists develop a hornless Holstein using CRISPR gene editing. Are you ready to eat it?" Oct 20, 2016.

Title: Yam Festival
Media Outlet/Organization: Tarbor City
Activity Date: 10/15/2016
Description: IGERT trainee, Johanna Elsensohn, volunteered at the Tarbor City Yam Festival, October 15, 2016.

Publications, Presentations, and Patents

Journal Articles in Refereed Publications

5a. Journal Articles in Refereed Publications

Aly, M.F.K., Kraus, D.A., & Burrack, H.J. (2016). Effects of post-harvest cold storage on the development and survival of immature *Drosophila suzukii* (Matsumura) in artificial diet and fruit. *Journal of Economic Entomology*. <https://doi.org/10.1093/jee/tow289>

Anstead, C. A., Batterham, P., Korhonen, P. K., Young, N. D., Hall, R. S., Bowles, V. M., Richards, S., Scott, M. J. & Gasser, R. B. (2016). A blow to the fly - *Lucilia cuprina* draft genome and transcriptome to support advances in biology and biotechnology. *Biotechnology Advances*. 34, 605-620. doi: 10.1016/j.biotechadv.2016.02.009.

*Backus, G.A., & Gross, K. (2016). Genetic engineering to eradicate invasive mice on islands: Modeling the efficiency and ecological impacts. *Ecosphere*: 7(12): e01589. doi: 10.1002/ecs2.1589

Boeke, J., Church, G., Hessel, A., Kelley, N.J., Arkin, A., Cai, Y., Carlson, R., Chakravarti, A., Cornish, V.W., Holt, L., Isaacs, F.J., Kuiken, T., Lajoie, M., Lessor, T., Lunshof, J., Maurano, M.T., Mitchell, L.A., Rine, J., Sanjana, N.E., Silver, P.A., Valle, D., Wang, H., Way, J.C., Yang, L. (2016). The Genome Project-Write. *Science*: aaf6850. DOI: 10.1126/science.aaf6850

Brown, Z. S., Kramer, R. A., Ocan, D., & Oryema, C. (2016). Household perceptions and subjective valuations of indoor residual spraying programs to control malaria in northern Uganda. *Infectious Diseases of Poverty*: 5(100). doi: 10.1186/s40249-016-0190-1

Brown, Z. S., Oueslati, W., & Silva, J. (2016). Links between urban structure and life satisfaction in a cross-section of OECD metro areas. *Ecological*

Chu F., *Klobasa, W., Wu, P., Pinzi, S., Grubbs, N., Gorski, S., Cardoza, Y. & Lorenzen, M.D. (2017). Germline transformation of the western corn rootworm, *Diabrotica virgifera virgifera*. *Insect Molecular Biology*. doi: 10.1111/imb.12305

Concha, C., Palavesam, A., Guerrero, F.D., Sagel, A., Li, F., Hernandez, Y., Pardo, T., Quintero, G., Vasquez, M., Phillips, P.L., McMillan, W.O., Skoda, S.R. & Scott, M.J. (2016). A transgenic male-only strain of the New World screwworm for an improved control program using the sterile insect technique. *BMC Biology*: 14(72), 1-13. DOI: 10.1186/s12915-016- 0296-8

Cribben, C. D., Thomasson, J. A., Ge, Y., Morgan, C. L. S., Yang, C., Isakeit, T., & Nichols, R. L. (2016). Site-Specific Relationships between Cotton Root Rot and Soil Properties. *Journal of Cotton Science*: 20, 67-75

Cummings C. & Kuzma, J. (2017). Societal Risk Evaluation Scheme (SRES): Scenario-based Multi-criteria Evaluation of Synthetic Biology Applications. *PLoS ONE* :12(1), e0168564. doi:10.1371/journal.pone.0168564

Diepenbrock, L.M. & Burrack, H.J. (2016). Variation of within-microhabitat use by *Drosophila suzukii* (Diptera: Drosophilidae) in blackberry. *Journal of Applied Entomology*. DOI:10.1111/jen.12335

Diepenbrock, L.M., Swoboda-Bhattarai, K.A. & Burrack, H.J. (2016). Oviposition preference, fidelity, and fitness of *Drosophila suzukii* in a co-occurring crop and non-crop host system. *Journal of Pest Science*. DOI: 10.1007/s10340-016- 0764-5

Fritz, M. L., Paa, S., *Baltzegar, J., & Gould, F. (2016). Application of a dense genetic map for assessment of genomic responses to selection and inbreeding in *Heliothis virescens*. *Insect Molecular Biology*: 25, 385-400. DOI: 10.1111/imb.12234

Haenn, N. (2016) The Middle-Class Conservationist: Social Dramas, and Blurred Identity Boundaries and their Environmental Consequences in Mexican Conservation. *Current Anthropology*: 57(2), 197-218

Kaebnick, G. E., Heitman, E., Collins, J. P., Delborne, J. A., Landis, W. G., Sawyer, K., Tanneyhill, L., & Winickoff, D. E. (2016). Precaution and governance of emerging technologies. *Science*: 354(6313), 710D711. <https://doi.org/10.1126/science.aah5125>

Kanost, M.R., Arrese, E.L., Cao, X., É Lorenzen, M.D., É et al. (2016). Multifaceted biological insights from a draft genome sequence of the tobacco hornworm moth, *Manduca sexta*. *Insect Biochemical Molecular Biology*: pii: S0965-1748(16)30094- 7. doi:10.1016/j.ibmb.2016.07.005

Kern, E.M.A., Robinson, D., Gass, E., Godwin, J., & Langerhans, R.B. (2016). Correlated evolution of personality, morphology, and performance. *Animal Behavior*: 117, 79-86

Kim, D., Brown, Z. S., et al. (2016). The value of information in decision-analytic modeling for malaria control in East Africa. *Risk Analysis*. doi:10.1111/risa.12606

Kimmel, S. C., Toohey, N. M., & Delborne, J. A. (2016). Roadblocks to responsible innovation: Exploring technology assessment and adoption in U.S. public highway construction. *Technology in Society*: 44, 66D77. <http://doi.org/10.1016/j.techsoc.2015.12.002>

Kuiken, T. (2016). Governance: Learn from DIY biologists. *Nature*: 531, 167-168

Kuzma, J. (2017). Forum: Biosecurity Governance for a Realistic New World. *Issues in Science and Technology*: 33(2). <http://issues.org/33-2/forum-33/>

Kuzma, J. (2016). A Missed Opportunity for Biotech Regulation. *Science*: 353, 1211-1213

Kuzma, J. (2016). Rebooting the Debate about Genetic Engineering. *Nature*: 531, 165-167

Kuzma J., Kokotovich, A., & Kuzhabekova, A. (2016). Attitudes Towards Governance of Gene Editing. *Asian Biotechnology Development Review*: 18(1), 69-92

Kuzma J. & Rawls, L. (2016). Engineering the Wild: Gene Drives and Intergenerational Equity. *Jurimetrics: The Journal of Law, Science and Technology*: 56(3), 279-296

Kuzma, J. & *Roberts, J.P. (2016). Is Adaptation or Transformation Needed? : Active Nanomaterials and Risk Analysis. *Journal of Nanoparticle Research*: 18(7), 1-18

Legros, M., Otero, M., Aznar, V.R., Solari, H., Gould, F. & Lloyd, A.L. (2016). Comparison of two detailed models of *Aedes aegypti* population dynamics. *Ecosphere*. 7(10):e01515. doi:10.1002/ecs2.1515

Li, F. & Scott, M. J. (2016). CRISPR/Cas9-mediated mutagenesis of the white and Sex lethal loci in the invasive pest, *Drosophila suzukii*. *Biochemical and Biophysical Research Communications*: 469 (4), 911-916. doi: 10.1016/j.bbrc.2015.12.081

Li, G., Reising, D., Miao, J., Gould, F., Huang, F., & Feng, H. (2016). Frequency of Cry1F Non-Recessive Resistance Alleles in North Carolina Field Populations of *Spodoptera frugiperda* (Lepidoptera: Noctuidae). *PLoS ONE*: 11(4), e0154492. doi:10.1371/journal.pone.0154492

Lin, C-Y., Li, Q., Tunalaya-Anukit, S., Shi, R., Sun, Y-H., Liu, J., Loziuk, P., Edmunds, C.W., Miller, Z.D., Peszlen, I., Muddiman, D.C., Sederoff, R.R., & Chiang, V.L. (2016) An anionic peroxidase PtrPO21 involved in lignin biosynthesis in *Populus trichocarpa*. *Tree Genetics & Genomes*: 12, 1-18

Linger, R. J., Belikoff, E. J., Yan, Y., Li, F., Wantuch, H. A., Fitzsimons, H. L. & Scott, M. J. (2016). Towards next generation maggot debridement therapy: transgenic *Lucilia sericata* larvae that produce and secrete a human growth factor. *BMC Biotechnology*: 16(30), 1-12. doi: 10.1186/s12896-016-0263-z

McPhie, D.R. & Burrack, H.J. (2016). Effects of microbial, organically acceptable, and reduced risk insecticides on *Anthonomus signatus* (Curculionidae: Coleoptera) in strawberries (*Fragaria ? ananassa*). *Crop Protection*: 89, 255-258. DOI: 10.1016/j.cropro.2016.07.034

McPhie, D.R. & Burrack, H.J. (2016). Effect of Simulated *Anthonomus signatus* (Coleoptera:Curculionidae) Injury on Strawberries (*Fragaria ? Ananassa*) Grown in Southeastern Plasticsulture Production. *Journal of Economic Entomology*. <https://doi.org/10.1093/jee/tow266>

- Monaghan, A.J., Morin, C.W., Steinhoff, D.F., Wilhelmi, O.V., Hayden, M., Quattrochi, D.A., Reiskind, M.H., Lloyd, A.L., Smith, K., Schmidt, C.A., Scalf, P.E. & Ernst, K.C. (2016). On the seasonal occurrence and abundance of the Zika virus vector mosquito *Aedes aegypti* in the contiguous United States. *PLoS Currents Outbreaks*. doi:10.1371/currents.outbreaks.50dfc7f46798675fc63e7d7da563da76
- Navarro Olmedo, S., Haenn, N., Schmook, B., & Radel, C. (2016). The Legacy of Mexico's Agrarian Counter-Reforms: Reinforcing Social Hierarchies in Calakmul, Campeche. *Journal of Agrarian Change*: 16(1), 145-167
- Okamoto, K.W., Gould, F. & Lloyd, A.L. (2016). Integrating transgenic vector manipulation with clinical interventions to manage vector-borne diseases. *PLoS Computational Biology*: 12(3), e1004695. doi:10.1371/journal.pcbi.1004695
- Price, A.J., Monks, C. D., Culpepper, A. S., Duzy, L. M., Kelton, J. A., Marshall, M. W., Steckel, L. E., Sosnoskie L.M., & R. L. Nichols. (2016). High Residue Cover Crops Alone or with Strategic Tillage to Manage Glyphosate-Resistant Palmer amaranth (*Amaranthus palmeri*) in Southeastern Cotton (*Gossypium hirsutum*). *Journal of Soil and Water Conservation*: 71, 1-11
- Radel, C., Schmook, B., Haenn, N., & Green, L. (2016). The Gender Dynamics of Conditional Cash Transfers and Smallholder Farming in Calakmul, Mexico. *Women's Studies International Forum*. DOI:10.1016/j.wsif.2016.06.004
- Salas, R., Burgos, N., Tranel, P., Singh, S., Glasgow, L., Scott, R. C., & Nichols, R. L. (2016). Resistance to PPO Inhibiting Herbicides in Palmer amaranth in Arkansas. *Pest Management Science*: 72(5) 864-869. doi: 10.1002/ps.4241
- Schwartz, S., Truglio, M., Scott, M.J., & Fitzsimons, H.L. (2016). Long-term Memory in *Drosophila* Is Influenced by the Histone Deacetylase HDAC4 Interacting with the SUMO-Conjugating Enzyme Ubc9. *Genetics*: 203, 1249-1264. doi: 10.1534/genetics.115.183194
- Sierras A. & Schal, C. (2016). Comparison of ingestion and topical application of insecticides against the common bed bug, *Cimex lectularius* (Hemiptera: Cimicidae). *Pest Management Science*: 73(3), 521-527
- Slone, J.D. & Burrack, H.J. (2016). Integrated pest management practices reduce insecticide applications, preserve beneficial insects, and decrease pesticide residues in flue cured tobacco production. *Journal of Economic Entomology*. <http://dx.doi.org/10.1093/jee/tow191>
- Swoboda-Bhattarai, K.A. & Burrack, H.J. (2016). *Drosophila suzukii* infestation in ripe and ripening caneberries. *Acta Horticulturae*: 1133. DOI: 10.17660/ActaHortic.2016.1133.65.
- Thekke-Veetil, T., Khadgi, A., Johnson, D., Burrack, H.J., Sabanadzovic, S., & Tzanetakis, I.E. (2017). First report of raspberry leaf mottle virus in blackberry in the United States. *Plant Disease*: 101, 265. <http://dx.doi.org/10.1094/PDIS-07-16-1014-PDN>
- Vazquez-Prokopec, G.M., Perkins, T.A., Waller, L.A., Lloyd, A.L., Reiner, R.C., Scott, T.W. & Kitron, U. (2016). Coupled heterogeneities and their impact on parasite transmission and control. *Trends in Parasitology*: 32, 356-367. doi:10.1016/j.pt.2016.01.001
- Yang, C., Odvody, G.N., Thomasson, J.A., Isakeit, T., & Nichols, R.L. (2016). Change detection of cotton root rot infection over a 10-year interval using airborne multispectral imagery. *Computers and Electronics in Agriculture*: 123, 154-162
- Zhang Y., Wang, Y., Xie, F., Zhang, B., Nichols, R. L., & Pan, X. (2016). Identification and characterization of miRNAs in the plant parasitic root-knot nematode *Meloidogyne incognita*. *Functional and Integrated Genomics*: 16, 127-142. doi: 10.1007/s10142-015-0472-x
- Zheng, X., Hoegenauer, K. A., Quintana, J., Bell, A. A., Nichols, R. L. & Stelly, D. M. (2016). Flanking Recombinants around Ren Ion in Wide-Cross Cotton Germplasm using SNPSs and MAS. *Crop Science*: 56, 1-14. doi: 10.2135/cropsci2015.07.0436

Journal Articles in Non-Refereed Publications

5b. Journal Articles in Non-Refereed Publications

- Brown, Z.S. (2016). The Economics, Regulation and International Implications of Gene Drives in Agriculture. *NC State Economist*. November/December Issue. https://ag-econ.ncsu.edu/wp-content/uploads/2016/12/november2016_gene_drives.pdf
- *Elsensohn, J.E. (2017). New Federal Report on Aedes Mosquitoes Could Signal Shift in How Zika Virus and Other Pathogens are Researched. *Entomology Today*. <https://entomologytoday.org/2017/01/18/new-federal-report-on-aedes-mosquitoes-could-signal-shift-in-how-zika-virus-and-other-pathogens-are-researched/>.
- *Elsensohn, J.E. on behalf of the ESA Science Policy Fellows. (2016). A Post-Election Washington, D.C.: The ESA Science Policy Fellows' Perspective. *Entomology Today*. <https://entomologytoday.org/2016/11/30/a-post-election-washington-d-c-the-esa-science-policy-fellows-perspective/>.
- Haenn, N. (2016). Review of Christopher R. Boyer Political Landscapes: Forests, Conservation, and Community in Mexico. *Agricultural History*: 90(2), 261-262.
- Lloyd, A. (2016). Let's Subtract Zika. *NC State University College of Sciences News*. <https://sciences.ncsu.edu/news/lets-subtract-zika/>
- Ouaghrham-Gormley, B., Vogel, S., Vogel, K.M. (2016). Gene Drives: The Good, The Bad, The Hype. *Bulletin of the Atomic Scientists*: 72. <http://thebulletin.org/gene-drives-good-bad-and-hype10027>.
- *Serr, M. & Communication & Outreach Group of the National Bsal Task Force. (2016). The Salamander Crisis: They face a deadly fungal threat. *Reptiles Magazine*: September/October Issue, 26-29.

Books

5c. Books

Delborne, J. & National Academies of Science, Engineering, and Medicine Committee on Gene Drives. (2016). *Gene Drives on the Horizon: Advancing Science, Navigating Uncertainty, and Aligning Research with Public Values*. Washington, D.C.: National Academies Press. DOI: <https://doi.org/10.17226/23405>

Gould, F. & National Academies of Science, Engineering and Medicine Committee on Genetically Engineered Crops. (2016). *Genetically Engineered Crops: Experiences and Prospects*. Washington, DC. National Academies Press. DOI: <https://doi.org/10.17226/23395>

Haenn, N., Wilk, R., & Harnish, A. eds. (2016) *The Environment in Anthropology: A Reader in Ecology, Culture, and Sustainable Living*, 2nd ed. New York, New York University Press. ISBN-13: 978-0814736371

Kuzma, J. & National Academies of Sciences, Engineering, and Medicine Committee on Future Biotechnology. (2017). *Preparing for Future Products of Biotechnology*. Washington, DC: The National Academies Press. DOI: 10.17226/24605.

Book Chapters

5d. Book Chapters

Delborne, J.A. (2016). Suppression and Dissent in Science. In Bretag, T. (Ed). *Handbook of Academic Integrity*. (Section IX, pp. 943-956). Singapore: Springer Singapore. ISBN: 978-981-287-097-1

Godwin, J., & Lamm, M. (2017). Socially Controlled Sex Change in Fishes. In: Pfaff, D.W & Jols, M. (Eds-in-chief). *Hormones, Brain, and Behavior* 3rd edition, Vol 2. (pp. 314-46). Oxford: Academic Press. ISBN: 978-0-12-803608-2

*Pitts, E., & Jameson, J.K. (2016). Promoting Ontological Insecurity to Transform the Governance of Science. In Kellett, P.M. & Matyok, T.G. (Eds). *Transforming conflict through communication in personal, family, and working relationships*. (pp. 247- 269). New York: Lexington Books. ISBN: 978-1-4985-1501-6

Vogel, K. M. (2016). Aftershocks of the 2001 Anthrax Attacks. In Lentzos, F., (Ed). *Biological Threats in the 21st Century*. (pp. 211-237). London: Imperial College Press. ISBN: 978-1-78326-947-1

Conference Publications

5g. Conference Publications

Clark, N.E., Frigulti, T., Ulloa, M., Hutmacher, R., Wright, S.D., Keeley, M., & Nichols, R. L. (2016). The Use of Disease Severity Variable in Predicting Efficacy of FOV4 Resistance Selection. *Proceedings of the Beltwide Cotton Conferences*. (pp. 458-463) Memphis, TN: National Cotton Council.

*Elsensohn, J.E., Burrack, H.J., Brown, Z.S., & Kuzma, J. (2016). Comparative risk analysis for agricultural genetic pest management technologies. *Society for Risk Analysis Annual Conference Proceedings*. San Diego, CA: Society for Risk Analysis. <http://www.sra.org/sites/default/files/pdf/events/SRA%20Final%20Program%20-%20R6.pdf>

Frigulti, T., Clark, N. E., Ulloa, M., Hutmacher, R., Wright, S. D., Keeley, M., Roberts, P. A., & Nichols, R. L. (2016). Recurrent Selection Performance for FOV Race 4 Resistance in Selected Germplasm and Progeny. *Proceedings of the Beltwide Cotton Conferences*. (pp. 160-162). Memphis, TN.: National Cotton Council.

Gaylon, M., Frame, H., Fromme, D., Dodds, D., Edmisten, K., Jones, M., Norton, R., Jones, A., Robertson, B., Boman, R., Raper, T., Lewis, K., Delaney, D., Hagan, A., & Nichols, R.L. (2016). Impact of Soil Applied Potassium on Cotton Yield across the Cotton Belt. *Proceedings of the Beltwide Cotton Conferences*. (pp. 367-371) Memphis, TN: National Cotton Council.

Kuzma, J. (2016). Anticipatory governance of gene drives. *International Congress of Entomology Conference Proceedings*. Orlando, FL: International Congress of Entomology. DOI: 10.1603/ICE.2016.92368

Kuzma, J. (2016). Systems thinking for risk governance of gene drives: A deliberative workshop. *Society for Risk Analysis Annual Conference Proceedings*. San Diego, CA: Society for Risk Analysis. <http://www.sra.org/sites/default/files/pdf/events/SRA%20Final%20Program%20-%20R6.pdf>.

*Roberts, J.P., *Barnes, J.C., *Barnhill, S.K., & *Sudweeks, J. (2016). The Genetically Modified American Chestnut Tree and Surface Mine Reclamation: Modeling the Potential for Restoration. In: Frey, G.E. & Nepal, P. (Eds). *Forest economics and policy in a changing environment: how market, policy, and climate transformations affect forests*. Proceedings of the 2016 Meeting of the International Society of Forest Resource Economics. (pp. 154). Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station.

Sikkens, R., Weaver, D., Lawrence, K. S., & Nichols, R. L. (2016). Comparative Performance of Reniform Nematode Resistant Germplasm Lines. *Beltwide Cotton Conferences*. (pp. 453-457) Memphis, TN: National Cotton Council.

Conference Presentations

5h. Conference Presentations

*Backus, G.A. & Gross, K. (2016, August). Genetically engineered mice for eradicating invasive mouse populations: Estimating the efficiency and ecological impacts. Poster presented at the Ecological Society of America, Fort Lauderdale, FL.

*Backus, G., *Leitschuh, C., *Serr, M., & *Valdez, R.X. (2016, October). Genetic Engineering for Conservation: A Policy Framework for Eradicating Invasive Rodents with Gene Drive Technology. Paper presented at The Wildlife Society (TWS) Annual Conference, Raleigh, NC.

*Baltzegar, J., *Barnes, J.C., *Elsensohn, J.E., *Gutzmann, N., *Jones, M.S., *King, S., & *Sudweeks, J. (2016, September). Gene Drive Insects in Agriculture. Poster presented at the XXV International Congress of Entomology, Orlando, FL.

- *Barnes, J.C. (2017, February). Engineering Futures in Biodiversity Conservation. Paper presented at the Seventh Annual Dimensions of Political Ecology Conference, Lexington, KY.
- *Barnes, J.C. (2017, January). Blight resistant American chestnut: Reintroduction of a Novel Organism. Poster presented at the 8th Biennial Conference of the International Biogeography Society, Tucson, AZ.
- *Barnes, J.C. (2017, January). Anticipating American chestnut Restoration. Oral presentation at the National Nanotechnology Coordinated Infrastructure Winter School on Responsible Innovation and Social Studies of Emerging Technologies, Mesa, AZ.
- Brown, Z. (2016, July). Voluntary Programs to Encourage Compliance with Refuge Regulations for Pesticide Resistance Management: Results from a Quasi- Experiment. Paper presented at the AAEA Annual Meeting, Boston, MA.
- Brown, Z., Rejesus, R.M., Yorobe Jr., J.M., Connor, L. (2016, July). Estimation of Spillover Effects from Large Scale Adoption of Bt Corn in the Philippines. Poster presented at the AAEA Annual Meeting, Boston, MA.
- Brown, Z. & Roh, H. (2016, June). Adaptive Resistance Management with Uncertain Fitness Costs. Paper presented at the AERE Summer Conference, Breckenridge, CO.
- Burrack, H.J. (2016, November). The Unexpected Invader. Paper presented at the Doors Between Floors Seminar Series for the Center for Integrated Pest Management and USDA APHIS Risk Management, Raleigh, NC.
- Burrack, H.J., Diepenbrock, L.M., Swoboda-Bhattarai, K., Zheng, Y., & Sial, A. (2016, September). A season-long strategy to manage spotted wing drosophila. Paper presented at the International Congress of Entomology. Orlando, FL.
- Chu, F. and Lorenzen, M.D. (2016, December). Development of transgenic helper/donor *Diabrotica virgifera virgifera* strains for use in genome-wide mutagenesis. Paper presented at the Monsanto Corn Academic Summit, St. Louis, MO.
- Delborne, J. (2016, December). Reflections from the National Academies of Sciences committee on non-human gene drives and responsible conduct. Paper presentation at the Society for Risk Analysis, San Diego, CA.
- Delborne, J. (2016, December). Public engagement and emerging biotechnologies: Opportunities and challenges for response- able science. Paper presentation at the Centro de Estudos Sociais, University of Coimbra, Coimbra, Portugal.
- Delborne, J. (2016, November). Incorporating public engagement throughout phased testing [of gene drives]. Paper presentation at the American Society for Tropical Medicine and Hygiene, Atlanta, GA.
- Delborne, J. (2016, November). Engagement as governance. Paper presentation at the Making the World Engineerable: Science, Practice, and Policy Conference, National Academies of Sciences, Engineering, and Medicine, Washington, DC.
- Delborne, J. (2016, November). Governing emerging biotechnologies: Expertise, democracy, and public engagement. Paper presentation at the Between Certainty and Experimentation, Department of Geography seminar series, University of North Carolina, Chapel Hill, NC.
- Delborne, J. (2016, October). Research, Advocacy, and Engagement: Exploring the Roles of Experts in Democracy. Paper presentation as the keynote address to the 2016 Research-to-Policy Conference: Pathways to Successful Engagement in Agricultural, Natural Resources and Food Issues, hosted by University of California Cooperative Extension (UCCE), University of California, Davis, CA.
- Delborne, J. (2016, September). Challenges of governing advances in gene editing. Paper presentation at the Institute for Science, Society and Policy, University of Ottawa, Ontario, Canada.
- Delborne, J. (2016, September). Diverse approaches for public engagement Symposium: What Constitutes Responsible Field Release of Transgenic Insects? Paper presentation at the International Congress of Entomology, Orlando, FL.
- Delborne, J. (2016, September). Mapping gene drive governance. Paper presentation at the Conference on Advancing Science for Policy through Interdisciplinary Research on Regulation, organized by University of California, Berkeley's Center for Science, Technology, Medicine and Society, Berkeley, CA.
- Delborne, J. (2016, September). GMOs, public perception, and opportunities for public engagement. Paper presentation at the Agricultural Biotechnology Training Program for Turkish delegation, coordinated by the College of Agriculture and Life Sciences (CALS) Global Academy and the Genetic Engineering and Society Center, NC State University, Raleigh, NC.
- Delborne, J. (2016, August). Public attitudes, perceptions, and engagement in the field of genetic modification. Paper presentation for the Regulatory Affairs for Crop Protection, NC State University, Raleigh, NC.
- Delborne, J. (2016, July). Perspectives from recent proceedings of the National Academy of Sciences and its June 2016 report, Gene Drives on the Horizon. Paper presentation at the Leadership Summit on Synthetic Biology Stakeholder and Community Engagement for Public Health, Conservation, and Food and Agriculture. Co- sponsored by the Wilson Center and the Keystone Policy Center, Washington, D.C.
- Diepenbrock, L.M., Swoboda-Bhattarai, K.A., & Burrack, H.J. (2016, September). Natural history matters: Using 19th Century techniques to solve 21st century pest problems. Paper presented at the International Congress of Entomology, Orlando, FL.
- *Elsensohn, J. E. , Brown, Z. S., & Burrack, H. J. (2016, December). Comparative risk analysis for agricultural genetic pest management technologies. Paper presented at the Society for Risk Analysis, San Diego, CA.
- *Elsensohn, J. E., Brown, Z. S., Delborne, J. A, & Burrack, H. J. (2016, September). New kids on the block: regulatory issues around emerging pests and emerging technologies. Poster presented at the International Congress of Entomology, Orlando, FL.
- *Elsensohn, J.E. & Burrack, H. J. (2017, March). Using basic ecology to inform in-field *Drosophila suzukii* management. Paper presented at the Southeastern Branch annual regional meeting of the Entomological Society of America, Nashville, TN.

- *Elsensohn, J. E., Li, F., & Scott, M. J. (2016, September). Development of genetic control tactics for spotted wing *Drosophila*. Paper presented at the Sustainable SWD Management SCRI Working Group Meeting, Hershey, PA.
- Godwin, J. (2016, August). *É*SRV Mice: Genetic approaches to controlling invasive rodent populations on islands. Paper presented as Invited symposium speaker at the North American Ornithological Conference, Washington, DC.
- Gould, F. (2017, February). Synergy Between Basic and Applied Studies of Herbivores and Their Hosts. 13th Keynote Address given at the Gordon Research Conference on Plant-Herbivore Interactions, Ventura, CA.
- *Gutzmann, N. (2016, September). A Framework for the Application of Genetic Pest Management in Agriculture. Poster presented at The XXV International Congress of Entomology, Orlando, FL.
- *Gutzmann, N. (2016, September). Identifying functional domains of a pesticide receptor using CRISPR/Cas9. Poster presented at The XXV International Congress of Entomology, Orlando, FL.
- Hoppin, J.A. (2016, November). Pesticides are Respiratory Hazards: Findings from the Agricultural Health Study. Paper presented for the UNC Cardiovascular Epidemiology Seminar Series, Chapel Hill, NC.
- Kang, J., & Thibert-Plante, X. (2016, June). Fish evolution in dynamic size-structured resources. Paper presented at Evolution, Austin, TX.
- Kuzma, J. (2016, November). Governance of Genetically Engineered Organisms: A Social Science Perspective. Oral presentation at the Agbiome seminar, Raleigh, NC.
- Kuzma, J. (2016, October). Hubris or Humility in the Regulatory Assessment of Gene Drives? Oral presentation at the NSF-funded workshop on Gene Editing: Life and Law Beyond the Human, SUNY-Buffalo, NY.
- Kuzma, J. (2016, October). Governance for Engineered Pests in Historical and Systems Contexts. Keynote address for OECD Workshop on Environmental Release of Engineered Pests: Building an International Governance Framework, Raleigh, NC.
- Kuzma, J. (2016, October). Gene Editing and Emerging Issues. Oral presentation given at the Agree Initiative, Meridian Institute, Washington, DC.
- Kuzma, J. (2016, September). Innovation in Governance. Oral presentation given at the North Carolina Agricultural Biotechnology Summit, Chapel Hill, NC.
- *Leitschuh, C. (2016, December). Contrasting ecological risks and benefits of genetic biocontrol for invasive rodents. Panel discussion conducted at the Society for Risk Analysis Annual Meeting, San Diego, CA.
- Loeb, G. M., Cowles, R. S., Rodriguez-Saona, C., & *Elsensohn, J. E. (2016, September). *Drosophila suzukii* alternate host and spatial distribution and improvement of pesticide efficacy. Paper presented at the International Congress of Entomology, Orlando, FL.
- Lloyd, A. (2017, February). *É*Genetic Control Strategies for Vector-Borne Diseases.*É*Paper presented as the Main Speaker at the ANZIAM Mathematical Biology Special Interest Group workshop, University of Adelaide, Adelaide, Australia.
- Lloyd, A. (2016, November). *É*Model Guided Design of Experiments and Data Collection. Paper presented at the MBI Workshop on Population Models in the 21st *É*Century, The Ohio State University, Columbus, OH.
- Lloyd, A. (2016, October). *É*Genetic Control Strategies for Vector-Borne Diseases.*É*Paper presented at the Operations Research Program seminar, NC State University, Raleigh, NC.
- Lloyd, A. (2016, September). *É*Control of Dengue by Combined Strategies. Paper presented at the International Congress of Entomology, Orlando, FL.
- Lloyd, A. (2016, July). *É*Control of Dengue by Combined Strategies.*É*Paper presented at the Society for Mathematical Biology *É*Annual *É*Meeting, University of Nottingham, Nottingham, UK.
- Lorenzen, M.D. (2017, April). Emerging technologies for genetic manipulation of western corn rootworm. Paper presented at the 26th IWGO Conference, Beijing, China.
- Lorenzen, M.D. (2017, January). Basic steps for developing genetic technologies in a non-model organism. Paper presented at the International Plant & Animal Genome Conference, San Diego, CA.
- Lorenzen, M.D. (2016, September). Trials and tribulations associated with transforming non-model organisms. Paper presented at the XXV International Congress of Entomology, Orlando, FL.
- Lorenzen, M.D. (2016, October). Progress towards genome-wide insertional mutagenesis of the western corn rootworm. Paper presented at the Bayer CropScience Seminar, Morrisville, NC.
- Merchan, H.A., Toennissen, T.A., & Burrack, H.J. (2016, September). How to analyze the data from an efficacy test? Evaluating the effect of different statistical analyses on the outcome of a pesticide efficacy experiment. Paper presented at the International Congress of Entomology, Orlando, FL.
- Nelson, P., Burrack, H.J., & Sorenson, C.E. (2016, September). Assessing the impacts of systemically-applied imidacloprid on the generalist hemipteran predator *Jalysus wickhami*. Paper presented at the International Congress of Entomology, Orlando, FL.
- *Pitts, E. (2016, November). Operationalizing Techne as Persuasive Knowledgeable Craft. Paper presented at the National Communication Association 102nd annual conference, Philadelphia, PA.
- *Pitts, E. (2016, November). Promoting Ontological Insecurity to Transform the Governance of Science, w/ Jessica Jameson. Paper presented at the National Communication Association 102nd annual conference, Philadelphia, PA.
- Scott, M.J. (2016, September). Development and evaluation of male-only strains of the New World screwworm. Paper presented at XXV International Congress of Entomology, Orlando, FL.

Scott, M.J. (2016, December). Next Gen Maggot Therapy 2.0. Paper presented at The sixth annual meeting of the American college of wound healing and tissue repair, Chicago, IL.

Scott, M.J. (2016, September). Male-only strains, Cas9 strains and gene drive in SWD. Paper presented at the Annual Meeting of the WERA 1021, Orlando, FL.

*Serr, M., Kanavy, D., *Leitschuh, C., Heard, N., & Godwin, J. (2016, August). Towards a genetic pest Management approach for invasive house mice. Oral presentation given at the North Carolina State University Program in Genetics Fall Retreat, Raleigh, NC.

*Serr, M., *Leitschuh, C., Kanavy, D., Bhaskar, B., Wolff, B., Sears, R., & Godwin, J. (2016, June). Exploring novel tools for conservation through the mating of wild and laboratory mouse strains. Poster presented at the Graduate Women in Science Conference, Raleigh, NC.

*Serr, M., *Leitschuh, C., Kanavy, D., Bhaskar, B., Wolff, B., Sears, R., & Godwin, J. (2016, June). Exploring novel tools for conservation through the mating of wild and laboratory mouse strains. Poster presented at the Evolution Conference, Austin, TX.

Slone, J. & Burrack, H.J. (2016, September). Overcoming barriers to IPM adoption in flue-cured tobacco. Paper presented at the International Congress of Entomology, Orlando, FL.

Swoboda-Bhattarai, K.A. & Burrack, H.J. (2016, September). Tracking spatial and temporal patterns of host use by *Drosophila suzukii* (Matsumura) to improve management programs in fruit crops. Paper presented at the International Congress of Entomology, Orlando, FL.

*Valdez, R.X. & Peterson, M.N. (2016, July). "It's like Disney on Acid": Content analysis of media covering invasive rodent eradications. Paper presented at the North American Congress for Conservation Biology (NACCB), Madison, WI.

Vitanovic, E., Boundy-Mills, K., Burrack, H.J., & Zalom F.G. (2016, September). Multi-trophic association of olive fruit, yeasts and olive fruit fly (*Bactrocera oleae* Gmel.) with possible implications for pest management. Paper presented at the International Congress of Entomology, Orlando, FL.

Vogel, K. (2016, November). Biosecurity. Paper presentation at the Making the World Engineerable: Science, Practice, and Policy Conference, National Academies of Sciences, Engineering, and Medicine, Washington, DC.

Vogel, K. (2016, September). Biotechnology and Bioterrorism: Re-Conceptualizing Bioweapons Threats. Paper presented at the Animal and Plant Health Inspection Service/USDA, Riverdale, MD.

Vogel, K. (2016, July). Improving Threat Assessment. Paper presented at Dogs that Haven't Barked: Towards an Understanding of the Absence of Technological Threats, Lawrence Livermore National Laboratory, Livermore, CA.

Vogel, K. (2016, June). Oral History of the US and Soviet Bioweapons Programs: How Memory of the Past can Inform Current International Security Problems. Paper presented at the History, Security, and Arms Control Workshop, University College London, London, UK.

Walton, V.M., Wiman, N.G., Dalton, D.T., Miller, B., York, R.M., Shearer, P.W., Tochen, S.L., Tanigoshi, L.K., Gerdeman, B.S., Lee, J.C., Ioriatti, C., Anfora, G., Grassi, A., Isaacs, R. & Burrack, H.J. (2016, September). Biology, management, and population modeling of *Drosophila suzukii* in western North American production regions. Paper presented at the International Congress of Entomology, Orlando, FL.

Partnerships/Collaborations

Academic Partner 1

Active Status

Yes

Partner Name

University of Adelaide

Type of partner

Ph.D.-granting institution

Funding arrangement for this partner

Partner provides funding to the IGERT project for research, curriculum, or other project activities, but not directly for trainees.

Other :A joint grant from both universities that awarded \$10,000 to research teams at each institution

Activities for this partner/institution

Facilities: IGERT trainees or faculty use a partner organization's facilities for project activities.

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Activities for this partner/institution

Joint research project on insect genomics, involving one of their faculty, Paul Thomas, working on development of an engineered mouse strain with gene drive.

Government Partner 1

Active Status

Yes

Partner Name

U.S. Naval Medical Research Unit - 6 Peru (NAMRU-6)

Type of government agency

U.S. Federal **laboratory or research facility**

Funding arrangement for this partner

Other :A separate NIH funded project on Dengue provides a CRADA contract to partner for the purposes of providing services or support of IGERT research related to the NIH project

Activities for this partner/institution

Facilities: IGERT trainees or faculty use a partner organization's facilities for project activities.

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Activities for this partner/institution

We have a joint research project in Iquitos Peru on Dengue epidemiology and potential for use of transgenic mosquitoes

Government Partner 2

Active Status

Yes

Partner Name

Centro Regional de Investigación en Salud Pública, INSP, Mex

Type of government agency

Foreign institution or foreign government/agency : Mexico

Funding arrangement for this partner

No funding/direct financial interaction is involved in this partnership.

Activities for this partner/institution

Facilities: IGERT trainees or faculty use a partner organization's facilities for project activities.

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Activities for this partner/institution

Two Cohort 3 fellows, Jennifer Baltzegar & Mike Jones, were helped by INSP while working in Mexico this summer on the maize weevil per their 3rd year funding proposal (see (see Intn'l Opp: Res/Edu Achievements). They spent 3 weeks in Mexico gathering economic and biological data from local farms. Janine Ramsey (Instituto Nacional de Salud Pública) assisted them with site selection locales and provided logistical support in country. Jen & Mike will also co-author an interdisciplinary paper describing the bio-economic landscape of the maize weevil in this region and will aim for publication in a journal such as the Journal of Economic Entomology or Journal of Stored Products Research. In addition, Jen will use genetic data collected with previous work to publish a paper on the genetic structure of MW populations in Oaxaca and Chiapas. Mike will use economic data gathered as preliminary data in a future proposal, which will encompass the majority of his dissertation.

Government Partner 3

Active Status

Yes

Partner Name

CSIRO Commonwealth Scientific and Industrial Research Organization Australia

Type of government agency

Foreign institution or foreign government/agency : Australia

Funding arrangement for this partner

Other :In development

Activities for this partner/institution

Facilities: IGERT trainees or faculty use a partner organization's facilities for project activities.

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Activities for this partner/institution

Collaboration for the mouse island eradication project (See Research Achievements). CSIRO personnel are involved at different levels but mostly in terms of risk analysis and regulatory pathway assessment.

Other Partner 1

Active Status

Yes

Partner Name

CIMMYT - International Maize and Wheat Improvement Center

Funding arrangement for this partner

No funding/direct financial interaction is involved in this partnership.

Activities for this partner/institution

Facilities: IGERT trainees or faculty use a partner organization's facilities for project activities.

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Activities for this partner/institution

Two of our fellows from Cohort 3, Jennifer Baltzegar & Mike Jones, were helped by CIMMYT during their work in Mexico this summer on the maize weevil per their 3rd year funding proposal (see Intn'l Opp: Res/Edu Achievements). They spent 3 weeks in Mexico gathering economic and biological data from local farms in preselected field sites. Martha Willcox (CIMMYT) assisted them with site selection locales and provided logistical support in country. Jen & Mike will also co-author an interdisciplinary paper describing the bio-economic landscape of the maize weevil in this region and will aim for publication in a journal such as the Journal of Economic Entomology or Journal of Stored Products Research. In addition, Jen will use genetic data collected with previous work to publish a paper on the genetic structure of MW populations in Oaxaca and Chiapas. Mike will use economic data gathered as preliminary data in a future proposal, which will encompass the majority of his dissertation.

Other Partner 2

Active Status

No

Partner Name

UN FAO Food and Agriculture Organization

Funding arrangement for this partner

No funding/direct financial interaction is involved in this partnership.

Activities for this partner/institution

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Personnel Exchange: IGERT Trainees, faculty and/or partner organization personnel use each other's facilities or work at each other's sites on an ad hoc or as-needed basis.

Internships: IGERT Trainees or faculty work in a partner's facilities specifically as interns.

Activities for this partner/institution

Other Partner 3

Active Status

Yes

Partner Name

OECD France

Funding arrangement for this partner

Partner provides funding to the IGERT project for research, curriculum, or other project activities, but not directly for trainees.

Activities for this partner/institution

Collaborative Research/Teaching: Partner organization's personnel work with IGERT project staff on collaborative research/teaching.

Activities for this partner/institution

Co-sponsored a symposium on developing a regulatory structure for gene drive in pest species (see Trainee Prep: Multi/Interdisciplinary Research).

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